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Watson et al.

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(54) **METHOD OF MAKING DETECTABLE SIGNAGE**

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This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

(60) Division of application No. 12/904,470, filed on Oct. 14, 2010, which is a continuation-in-part of application No. 12/766,286, filed on Apr. 23, 2010, now Pat. No. 7,985,364.

(51) **Int. Cl.**
B29C 45/14 (2006.01)

(52) **U.S. Cl.**
USPC **264/135**; 264/132; 264/275; 264/328.12; 264/328.18

(58) **Field of Classification Search**
None
See application file for complete search history.

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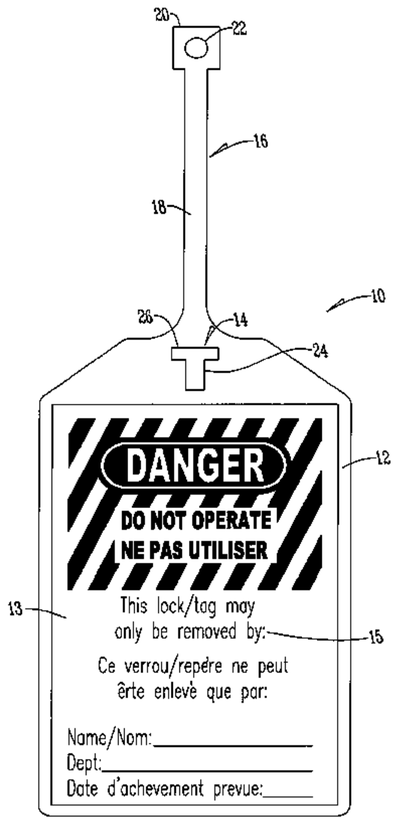
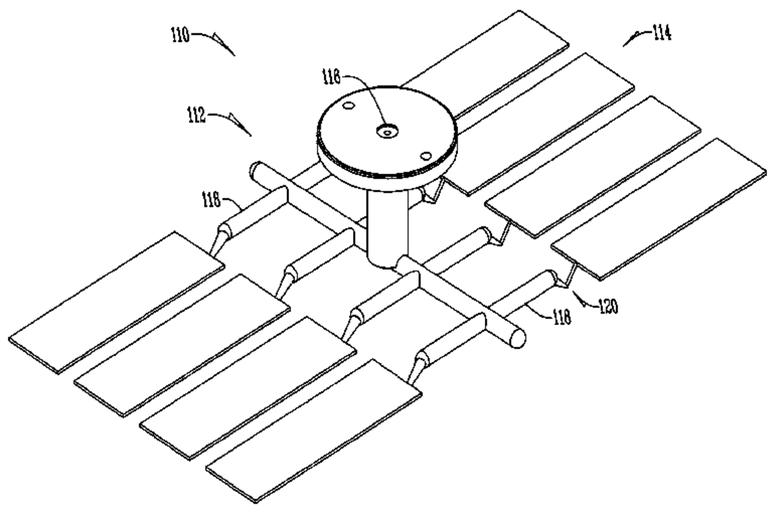
(57) **ABSTRACT**

Signage is presented comprising an in-mold plastic plate portion having a slot. The signage has a flexible tongue having a neck portion that extends outwardly from the plate portion and has a locking tip extending from the neck portion and the locking tip is formed to be received by the slot. The plastic plate portion is made of a filler material and a detectable additive such that the signage is easily detected by a metal detecting machine.

9 Claims, 4 Drawing Sheets





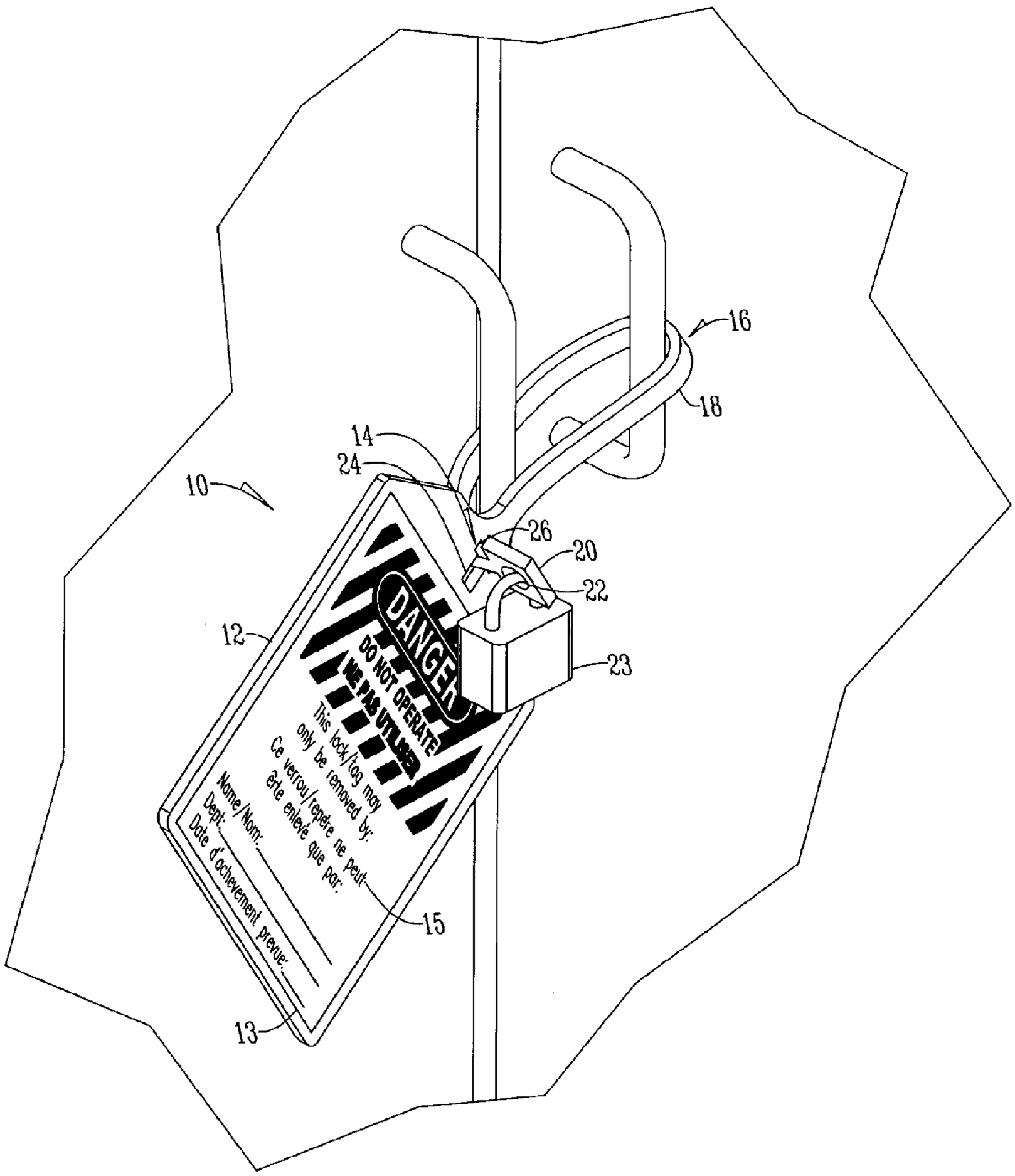

16
18
14
24
10
26
20
22
12
23
DANGER
DO NOT OPERATE
This lock/tag may only be removed by:
Ce verrou/repère ne peut être enlevé que par:
Name/Nom:
Dept:
Date d'achèvement prévue:
15
13

Fig. 1

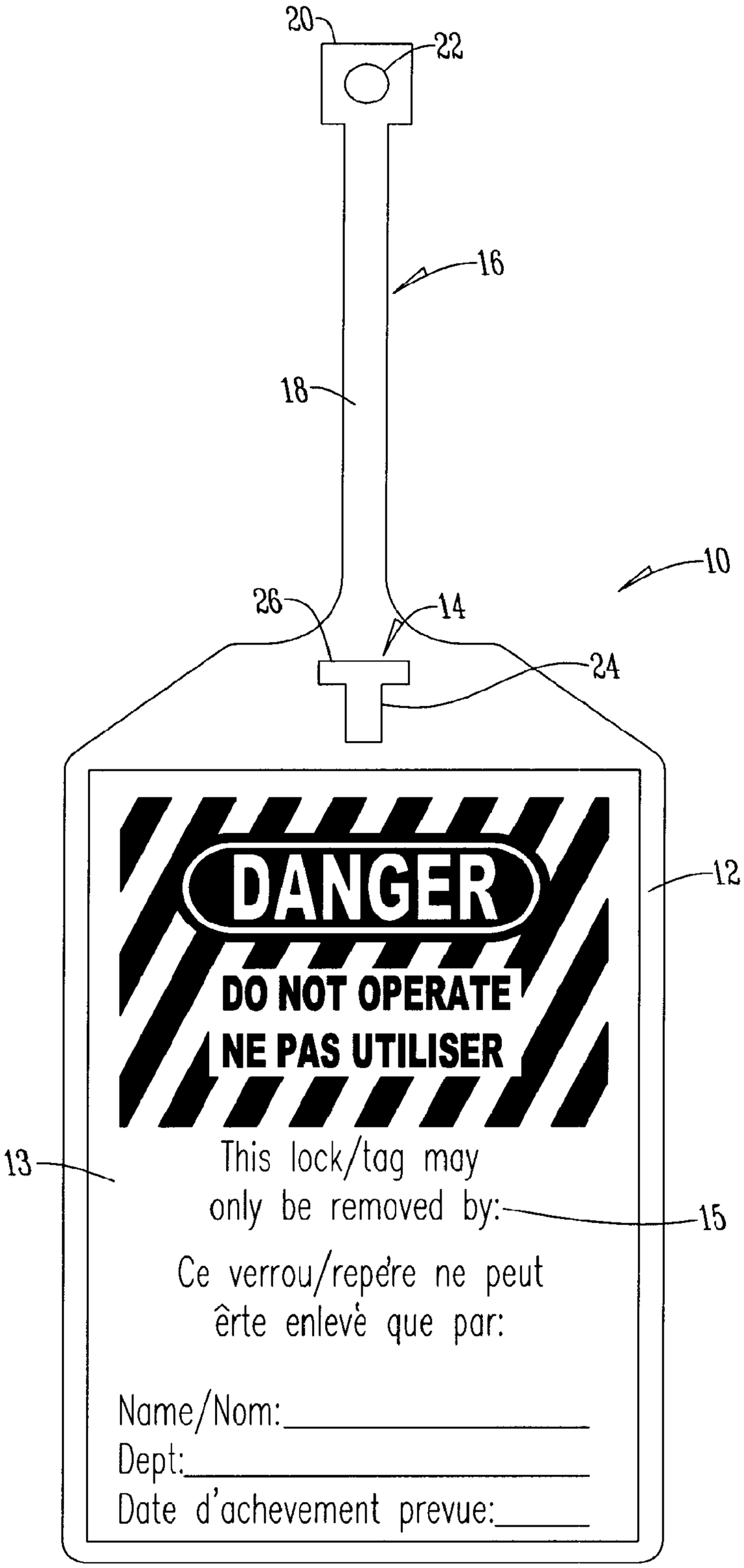

20
22
16
18
10
26
14
24
12
DANGER
DO NOT OPERATE
NE PAS UTILISER
13
This lock/tag may
only be removed by:
15
Ce verrou/repère ne peut
être enlevé que par:
Name/Nom:_____
Dept:_____
Date d'achevement prevue:_____

Fig. 2

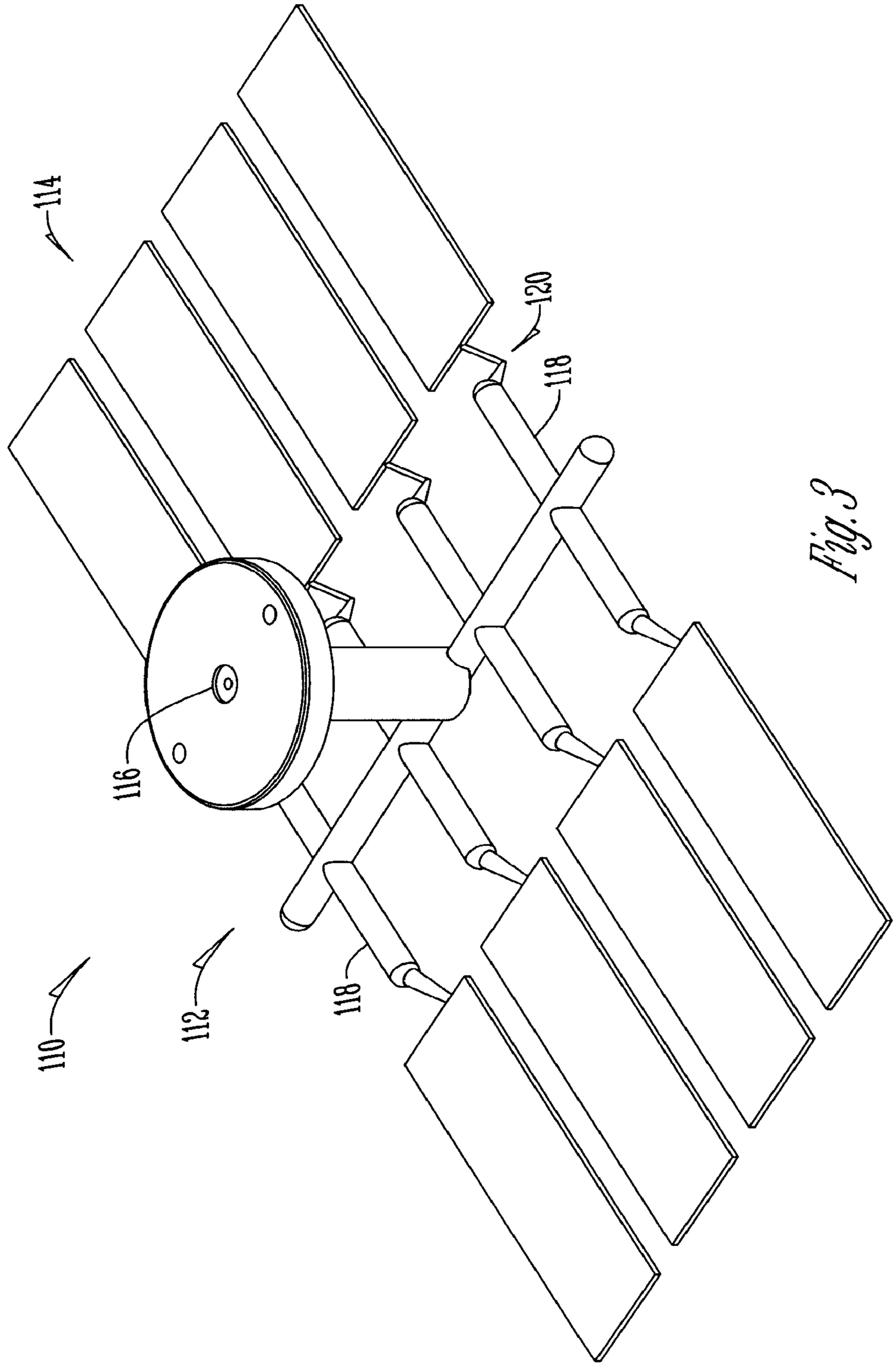


Fig. 3

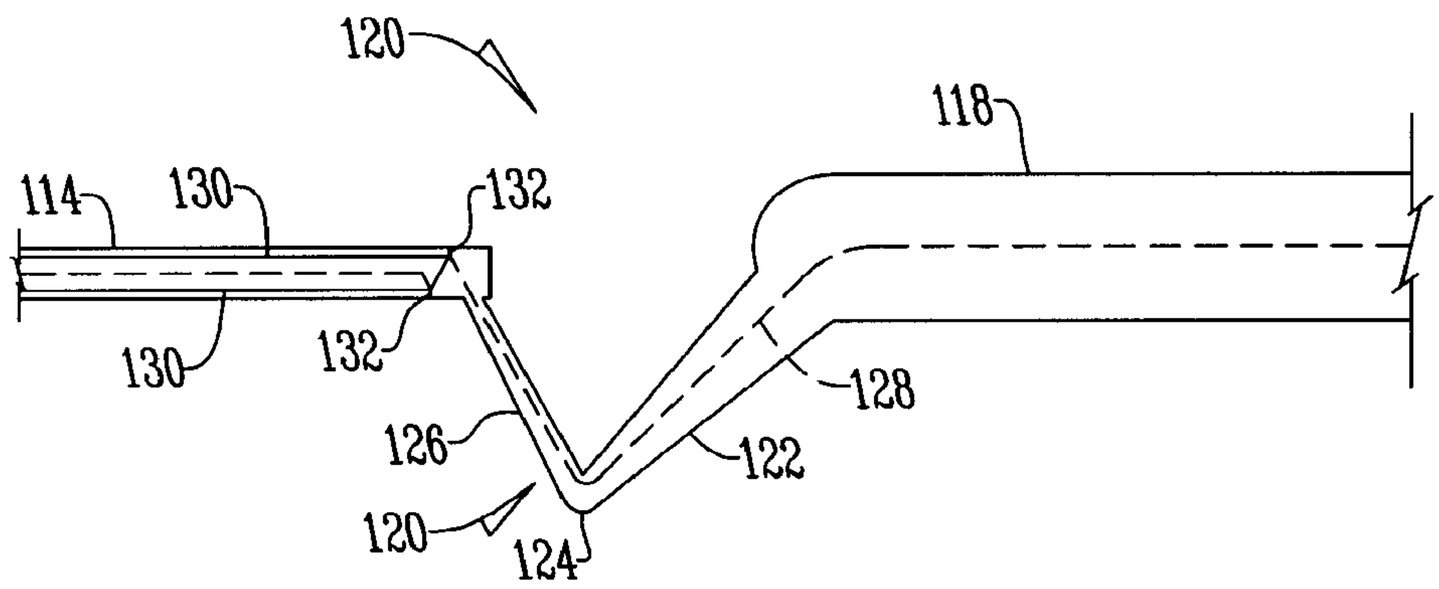


Fig. 4

METHOD OF MAKING DETECTABLE SIGNAGE

CROSS REFERENCE TO A RELATED APPLICATION

This application is a division of U.S. Ser. No. 12/904,470 filed Oct. 14, 2010, still pending, which is a continuation-in-part of Ser. No. 12/766,286 filed Apr. 23, 2010, now U.S. Pat. No. 7,985,364.

BACKGROUND OF THE INVENTION

This invention relates to injection molded products. More specifically, and without limitation, this invention relates to detectable signage and a method for producing injection molded detectable signage.

Attachable and detachable signage is used in countless applications and in countless industries to inform personnel of relevant information. As one example, in the food manufacturing or meat processing industry, signage is often attached to shipments of incoming raw materials or outgoing finished products to identify: (a) the date the shipment was received, (b) whether the shipment was inspected or who inspected the shipment, (c) the origin of the shipment, (d) the contents of the shipment, (e) the destination of the shipment, as well as countless other information and/or a marking area. While this signage varies in size, shape and design, conventionally much of this signage takes the form of a plastic injection molded tag having a label positioned thereon which contains the relevant information. While this conventional plastic injected molded signage may adequately inform personnel of relevant information contained thereon, problems still exist.

As an example, a problem exists when conventional plastic injection molded signage falls into these shipments.

In particular, in the food manufacturing or meat processing industry, a common method of inspecting these shipments for contaminants is through the use of automated metal detectors or magnetic material detectors. As conventional plastic injection molded signage does not contain metallic material, should a conventional plastic injection molded signage fall into the shipment, the signage will not be detected. This inability to detect the presence of contaminating signage allows for an unacceptably high risk of contamination, or requires additional manual inspection steps which increases processing time and costs. Therefore a need exists in the art for signage that is more easily detected.

Thus, a principal object of the present invention is to provide signage that is detectable.

Another object of the present invention is to provide a method of manufacturing detectable signage.

These and other objectives, features and advantages will be apparent to those of ordinary skill in the art based on the following written description.

BRIEF SUMMARY OF THE INVENTION

Signage is presented comprising an in-mold plastic plate portion having a slot. The signage has a flexible tongue having a neck portion that extends outwardly from the plate portion and has a locking tip extending from the neck portion and the locking tip is formed to be received by the slot. The plastic plate portion is made of a filler material and a detectable additive such that the signage is easily detected by a metal detecting machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a tag and a lock;

FIG. **2** is a top plan view of a tag;

FIG. **3** is a perspective view of an injection molding machine; and

FIG. **4** is a sectional view of the connection between a runner system of an injection molding machine and the mold cavity.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the figures, as an exemplary embodiment, a tag **10** has a plate portion **12**. Molded within the plate portion **12** is a sheet **13** having a graphics and printed indicia **15**. The graphics and indicia **15** may include a warning as well as information indicating the individual authorized to remove the tag **10** and/or a marking area.

Extending through the plate **12** is a slot **14**. While the slot is of any shape and size, preferred is a T-shaped slot. Extending outwardly from the plate portion **12** is an extension or tongue **16** having a neck portion **18**. In an alternative embodiment, the tongue **16** and neck portion **18** of tag **10** are replaced with any integral wire tie known in the art. This integral wire tie includes one, two or more strands of a malleable wire covered in a plastic material, as is well known in the art, which extend outwardly from the top of tag **10**. These malleable wires are then twisted or lockingly engaged with one another to attach tag **10**. Alternatively, this integral wire tie includes a conventional zip-tie arrangement, as is well known in the art, having an extended tongue having locking notches thereon, and a locking head having a slot with a locking mechanism therein. The tongue of the zip-tie arrangement is then passed through the locking head of the zip-tie arrangement thereby locking tag **10** in place.

The tongue **16** also has a locking tip **20**. The locking tip **20** is formed to be received within the slot **14** such that once the tip **20** passes through the slot and is twisted the tip **20** is retained by the tip **20** engaging a surface of the plate portion **12**. The neck **18** is made of a flexible material such that the neck **18** may be bent to permit the tip **20** to be received by and pass through the slot **14**. The locking tip **20** has an aperture **22** adapted to receive a lock **23**, such as a conventional padlock.

In use, a tag **10** is attached to a shipment, article, device, product or other object by way of bending tongue **16** around a portion of the object so that the locking tip **20** is received by and passes through the slot **14**. In the embodiment shown in the drawings, the neck **18** is bent and twisted such that the tip **20** slides through the narrow section **24** of the T-shaped slot **14**. Once through the slot **14**, when the neck **18** is permitted to untwist, the neck **18** is received in the transverse section **26** of the slot **14**, such that an edge of the tip engages a surface of the plate portion **12**. Once the tip **20** is retained, should the user desire, lock **23** is inserted through aperture **22** and locked in place.

In operation the body of tag **10** which includes plate portion **12**, tongue **16**, and neck portion **18** is manufactured as a single continuous piece through an injection molding process. In a first step, granulated, powdered or liquefied plastic, rubber, thermoplastic, thermosetting plastic, or the like filler material is combined with a detectable additive which is also granulated, powdered or liquefied, or is otherwise in a non-dusting form such as pellets. In a second step the combined filler material and the detectable additive is operatively mixed and heated such that a homogeneous detectable material results. Alternatively, the filler material and detectable additive are

individually heated to a liquefied form, and then combined with one another in a liquefied form and thereafter mixed to create a homogenous material. The resulting fluid or liquefied homogeneous combination of the filler material and detectable additive is then used in a manufacturing method, such as an injection molding process.

In one embodiment a sheet or label **13** is added to an opened injection mold with graphics or printed indicia **15** facing away from the cavity of the mold. The injection mold is then closed and the fluid homogeneous filler material and detectable additive is injected through a nozzle into the cavity of the mold. The fluid homogenous material contacts the non-indicia side of label **13** and bonds therewith and solidifies to form a single functional unit. In certain applications, binding or gluing material is placed on the non-indicia, or cavity side of the label **13** to further promote adhesion of the label **13** to the signage.

The detectable additive is a detectable metal material, or a magnetically detectable material such as any metallic or ferrous material. In one embodiment, detectable additive is PolyMag® material manufactured by Eriez Manufacturing Co., 2200 Asbury Road, Erie, Pa. 16506.

In a preferred embodiment, the quantity of the detectable additive is extremely small. The quantity of detectable additive is between 1% and 40% by weight of the mixed homogeneous detectable material, and preferably between 5% and 20% of the mixed homogeneous detectable material. The addition of the detectable additive visibly changes the color of the filler material. As an example, when the detectable additive is added to a white filler material the resulting product is somewhat grey in color. As another example, when the detectable additive is added to a red filler material the resulting product is a darker red or a somewhat maroon color. The resulting homogenous detectable mixture can further be pigmented any color through the addition of further coloring additives. Besides the detectable nature and somewhat darker color, the addition of the detectable additive does not otherwise affect the physical properties of the resulting product such as strength, melting point, etc.

As one exemplary way of making the detectable signage is presented with reference to the parent application, U.S. patent application Ser. No. 12/766,286 filed on Apr. 23, 2010 for a METHOD OF MANUFACTURING AN INJECTION MOLDED PRODUCT. With reference to FIGS. **3** and **4**, an injection molding assembly **110** is presented that has a runner system **112** that injects molten thermoplastic and detectable additive into a mold cavity **114**. The runner system **112** has an inlet **116** and a system of conduits **118** that provide a fluid flow of pressurized thermoplastics therethrough. Connecting the system of conduits **118** with the mold cavity **114** are a plurality of gate members or tunnel gates **120**.

The gate members **120** each have a first section **122** that angles downwardly from the conduit **18** of the runner system **12** toward the mold cavity **114**. The first section **122** tapers inwardly to a joint **124**. A second section **126** of the tunnel gate **120** extends upwardly from the joint **124** toward the mold cavity **114**. In this manner, the first and second sections form a V-shape. The second section **126**, like the first section, tapers inwardly such that the diameter of the connection between the gate member **120** and the conduit **118** is greater than the connection between the gate member **120** and the mold cavity **114**. In addition, the second section **126** is at an angle such that the flow of material **128** into the second section **126** enters the mold cavity **14** nearly perpendicular to the flow of material **128** through the mold cavity **114**.

Within the mold cavity **114** is an indicia carrier **130** that has a first edge **132**. The indicia carrier **130** in one embodiment is a label. Specifically, multiple indicia carriers **130** can be utilized including a carrier **130** that has man readable labels and carriers **130** that have Radio Frequency Identification (FRID) that are non line of sight and machine readable only.

In operation, molten thermoplastic is injected through the runner system **112** to the gate member or tunnel gate **120**. The thermoplastic is displaced through the gate member **120** and into the mold cavity onto the edge **132** of the indicia carrier **130** nearly perpendicular to the planar surface of the indicia carrier **130**. This has the effect of mechanically pinning the indicia carrier **130** into the proper position. Thereafter as the molten thermoplastic fills the cavity **114** air bubbles and wrinkles under the indicia carrier **130** are forced out and the finished product is smooth, bubble and wrinkle free such that the indicia carrier is 100% fused to the thermoplastic. Specifically, this manufacturing process exceeds all sanitation requirements. First, the entire mass of the product is brought to 395 F and then over 1,500 pounds of pressure is exerted to force it into the tool. The product is then subjected to a packing pressure until it solidifies.

In one embodiment the tag, label, sign or the like has an indicia carrier **130**, both on the front and rear of the molded product such that a man readable indicia is on one side and FRID indicia is on the other side. In this embodiment the molten thermoplastic impinges on the edge **132** of a first indicia carrier **130** and is then reflected backward onto the edge **132** of a second indicia carrier **130** thereby pinning both indicia carriers **130** within the mold cavity **14** as best shown by the flow of material **128** in FIG. **4**. Thus, a label utilizing a RFID is provided.

In an embodiment where ejector pins, as known in the art, are used and placed in close proximity to the gate member **120**, upon the finished part injection the tag, label, sign or the like formed in the mold is sheared off of the plastic runner system **112**. This eliminates the need for operators to cut and trim individual tags or labels.

Thus provided is a method for manufacturing an injected molded product that utilizes gate members **120** to provide a more efficient process and improved product. In addition, as compared to traditional tag manufacturing that requires reinforcement around an attachment hole by having the shear present this attachment method is eliminated. In addition, because the indicia carrier **130** is completely fused to the thermoplastic, moisture in high moisture environments is unable to get between the indicia carrier **130** and the molded body itself preventing contaminates from growing. Also, because the indicia carrier **130** is fused to the molded body, the indicia carrier is practically tamper proof. Any attempt to remove or modify the indicia carrier **130** is readily apparent to a casual observer. In addition, because injection molds for tags are easily manufactured with a bale or a loop of plastic that folds around an object and interlocks into a mating feature on the tag and can be used to include a padlock, additional safety is provided. In addition, a process for making labels having RFID is provided.

Thus, during the manufacturing of this product thermoplastics are heated within the barrel of an injection molding by the mechanical shear generated between the screw and the barrel. The temperature of the material exceeds 390 degrees Fahrenheit and is held under pressure until the next shot is required. At this time the material is subject to pressures exceeding 1800 PSI and is forced through the runner and gate systems. Additional heat is generated by the mechanical shear created by the forcing the material through the gates. After the cavity fills, a packing pressure is applied until thermoplastic solidifies and is ejected from the machine. These physical conditions exceed the standard operating procedures for auto

clave thereby producing a sterile and safe product. Thus, at the very least all of the stated objectives have been met. Whereas the invention has been shown and described in connection with the embodiments thereof, it will be understood that many modifications, substitutions, and additions may be made which are within the intended broad scope of the following claims. From the foregoing, it can be seen that the present invention accomplishes at least all of the stated objective.

What is claimed is:

1. A method of making detectable signage comprising the steps of:

heating a filler material and a detectable additive individually;

mixing the heated filler material with the heated detectable additive to form a homogeneous mixture;

placing a label having indicia positioned on one side into a cavity of an injection mold with the indicia facing away from the cavity;

placing a bonding material on a non-indicia side of the label;

injecting the homogenous mixture into the cavity of the injection mold through a runner system to a gate member having a first and second section; and

displacing the homogeneous mixture into the mold cavity through the first and second sections of the gate member into the cavity wherein the second section is angled such that the homogeneous mixture is displaced onto an edge of the label nearly perpendicular to the planar surface of the label to hold the label in position against the mold cavity;

such that the homogeneous mixture bonds to the label forming detectable signage.

2. The method of claim **1** wherein the detectable additive is 5% to 20% of the homogeneous mixture.

3. The method of claim **1** wherein the filler material is a plastic material.

4. The method of claim **1** wherein the detectable additive is in pellet form.

5. The method of claim **1** wherein the filler material is in pellet form.

6. The method of claim **1** wherein the homogenous mixture fuses to the label thereby providing sanitary signage.

7. The method of claim **1** wherein the homogenous mixture forces out all bubbles and wrinkles.

8. A method of making detectable signage comprising the steps of:

mixing a filler material with a detectable additive;

heating the mixed filler material and the detectable additive to form a homogeneous mixture;

placing a label having indicia positioned on one side into a cavity of an injection mold with the indicia facing away from the cavity;

placing a bonding material on a non-indicia side of the label;

injecting the homogenous mixture into the cavity of the injection mold through a runner system to a gate member having a first and second section; and

displacing the homogeneous mixture into the mold cavity through the first and second sections of the gate member into the cavity wherein the second section is angled such that the homogeneous mixture is displaced onto an edge of the label nearly perpendicular to the planar surface of the label to hold the label in position against the mold cavity;

such that the homogeneous mixture bonds to the label forming detectable signage.

9. The method of claim **8** wherein the filler material and the detectable additive are individually heated and then combined.

* * * * *